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RoHS·WEEE LITEMAX COMPLIANT

# LITEMAX SSF_SSH2833
# Spaxpixel
# 28” LED B/L LCD

# User Manual

(1st Edition 2012/8/3)
All information is subject to change without notice.

| Approved by | Checked by | Prepared by |
|---|---|---|
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**RECORD OF REVISION**

| Version and Date | Page | Old Description | New Description | Remark |
|---|---|---|---|---|
| Aug,3,2012 | all | | Initial Release | |
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## 1.0 GENERAL DESCRIPTION

SSF_SSH2833 is an ultra-wide, LED backlight LCD display. It provides LCD panel with specific ratios. This LCD display has a 28 inch diagonally measured active area. Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.

## 1.1 FEATURES

- Resizing LCD
- Ultra Wide Screen (16 : 3)
- LED Backlight
- High Brightness 700nits
- Low Power Consumption
- Wide Viewing Angle
- High Uniformity
- Wide Dimming
- Life Expectancy

## 1.2 GENERAL SPECIFICATIONS

| Model No. | SSF2833 | SSH2833 |
|---|---|---|
| **Description** | 28” Resizing LCD Module, 700nits, LED backlight, 1366x254 | |
| **Display Area** | 697.7 x 129.7 mm | |
| **Brightness** | 700nits | |
| **Resolution** | 1366 x 254 | |
| **Aspect Ratio** | 16 : 3 | |
| **Contrast Ratio** | 1200:1 | |
| **Pixel Pitch (mm)** | 0.51 x 0.51 | |
| **Viewing Angle** | 178°(H), 178°(V) | |
| **Display Colors** | 16.7M | |
| **Response Time (Typical)** | 8 ms | |
| **Power Consumption** | 40W | |
| **Dimensions (mm)** | 735.4x170.5x16.2mm (w/o BOS on the Light Box) | |
| **Weight (Net)** | 3.0Kg | 3.2Kg |

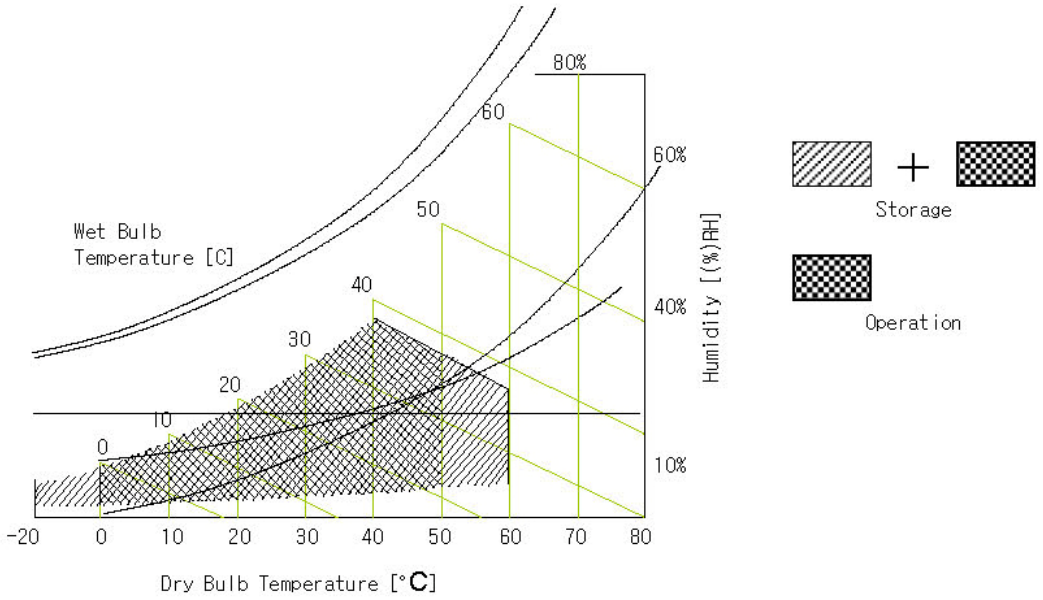
### 1.3 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. LCD Module Electrical Specifications > [VSS=GND=0V]

| Parameter | | Symbol | Min. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| Power Supply Voltage | LCD Module | VDD | VSS-0.3 | 13.2 | V | Ta = 25 ℃ |
| | Converter | VBL | VSS-0.3 | 26.4 | V | |
| Operating Temperature | | $T_{OP}$ | 0 | +50 | ℃ | Note 1 |
| | | $T_{SUR}$ | 0 | +60 | ℃ | |
| Storage Temperature | | $T_{ST}$ | -20 | +60 | ℃ | |
| Operating Ambient Humidity | | Hop | 10 | 80 | %RH | |
| Storage Humidity | | Hst | 10 | 80 | %RH | |

Note 1 : Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 ℃ max. and no condensation of water.



## 2.0 Electrical characteristics

TFT LCD Module

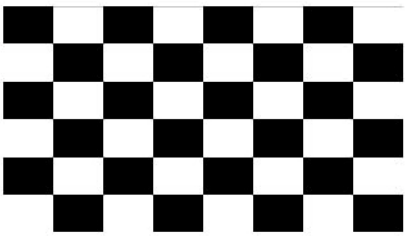
< Table 3. LCD Module Electrical Specifications >

[Ta =25±2 ℃]

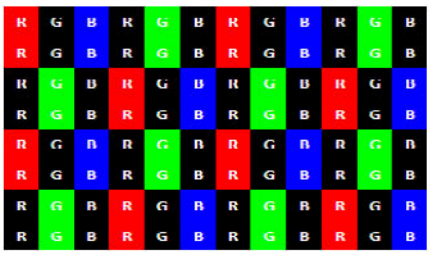
| Parameter | | Symbol | Values | | | Unit | Remark |
|---|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | | |
| Power Supply Input Voltage | | VDD | 10.8 | 12 | 13.2 | Vdc | |
| Power Supply Ripple Voltage | | VRP | | | 300 | mV | |
| Power Supply Current | | IDD | - | 333 | 592 | mA | Note 1 |
| Power Consumption | | PDD | | 4.0 | 7.1 | Watt | |
| Rush current | | IRUSH | - | - | 3.0 | A | Note 2 |
| LVDS Interface | Differential Input High Threshold Voltage | VLVTH | +100 | | +300 | mV | |
| | Differential Input Low Threshold Voltage | VLVTL | -300 | | -100 | mV | |
| | Common Input Voltage | VLVC | 1.0 | 1.2 | 1.4 | V | |
| CMOS Interface | Input High Threshold Voltage | VIH | 2.7 | - | 3.3 | V | |
| | Input Low Threshold Voltage | VIL | 0 | - | 0.6 | V | |

Note 1 : The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=12.0V,
Frame rate $f_V$=60Hz and Clock frequency = 75.4MHz.
Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)
Pattern(L0/L255)



b) Max : Skip 1H2V Sub Dot



Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

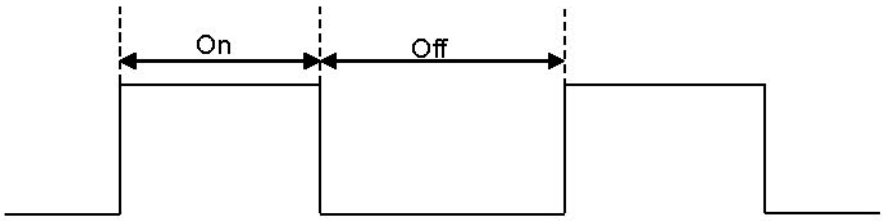
## LED Converter

< Table 4. LED Converter Electrical Specifications > [Ta =25±2 ℃]

| Parameter | Symbol | Condition | Values | | | Unit | Note |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | | |
| Input Voltage | VBL | | 22.8 | 24.0 | 25.2 | V | |
| Input Current | IBL | $V_{DIM}$=3.3V | - | 1.5 | 1.7 | A | Note 1 |
| Rush current | IRUSH | VBL= 24V | - | - | 3 | A | |
| Power Consumption | PBL | Typical Luminance | - | 36 | 40 | Watt | |
| B/L on/off control | $V_{ON/OFF}$ | BL ON = High | 2.8 | 3.3 | 5 | V | |
| | | BL OFF =Low | 0 | - | 0.8 | V | |
| Analog Dimming | $V_{DIM}$ | Voltage | 0 | | 3.3 | V | |
| | $L_{DIM}$ | Luminance | 20 | | 100 | % | |
| PWM Frequency | $F_{PWM}$ | | 140 | 190 | 240 | Hz | |
| PWM Level | High Level | | 2.8 | 3.3 | 5 | V | |
| | Low Level | | 0 | - | 0.5 | V | |
| PWM Duty | $D_{PWM}$ | | 10 | - | 100 | % | Note 2 |
| Life Time | | | 30k | - | - | Hrs | Note 3 |

Note 1:The specified current and power consumption are under the typical supply Input voltage, 24V. It is total power consumption.

Note 2 : High-duty = On/(On+Off) * 100




Note 3 : The life time of LED, 30,000Hrs, is determined as the time at which luminance of the LED is 50% compared to that of initial value at the typical LED current on condition of continuous operating at 25 ± 2°C.

### 3.0 Interface Connection

Connector : IS100-L30B-C23(Manufactured by UJU) or Equivalent.

< Table 5. LCM Module Input Connector Pin Configuration >

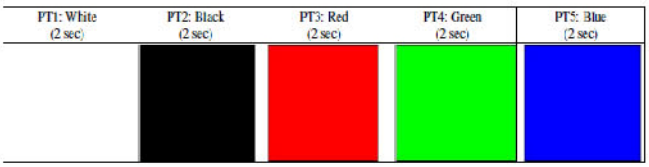
| Pin No | Symbol | Description | Pin No | Symbol | Description |
|---|---|---|---|---|---|
| 1 | VDD | Power Supply +12.0V | 16 | RX1+ | LVDS Receiver Signal(+) |
| 2 | VDD | Power Supply +12.0V | 17 | GND | Ground |
| 3 | VDD | Power Supply +12.0V | 18 | RX2- | LVDS Receiver Signal(-) |
| 4 | VDD | Power Supply +12.0V | 19 | RX2+ | LVDS Receiver Signal(+) |
| 5 | GND | Ground | 20 | GND | Ground |
| 6 | GND | Ground | 21 | RCLK- | LVDS Receiver Clock Signal(-) |
| 7 | GND | Ground | 22 | RCLK+ | LVDS Receiver Clock Signal(+) |
| 8 | GND | Ground | 23 | GND | Ground |
| 9 | LVDS_SEL | 'L'=JEIDA , 'H'or NC= VESA | 24 | RX3- | LVDS Receiver Signal(-) |
| 10 | NC | No Connection | 25 | RX3+ | LVDS Receiver Signal(+) |
| 11 | GND | Ground | 26 | GND | Ground |
| 12 | RX0- | LVDS Receiver Signal(-) | 27 | BIST | 'L' or NC=Free run mode , 'H'= BIST mode |
| 13 | RX0+ | LVDS Receiver Signal(+) | 28 | NC | No Connection |
| 14 | GND | Ground | 29 | NC | No Connection |
| 15 | RX1- | LVDS Receiver Signal(-) | 30 | GND | Ground |

Notes : 1. NC(Not Connected) : This pins are only used for BOE internal operations.

2. Input Level of LVDS signal is based on the IEA 664 Standard.
3. LVDS_SEL : This pin is used for selecting LVDS signal data format.
   If this Pin : High (3.3V) or Open (NC) → Normal NS LVDS format
   Otherwise : Low (GND) → JEIDA LVDS format
4. BIST : This pin is used for selecting display pattern mode when input DE or input CLOCK quits toggling.
   If this Pin : Low (GND) or Open (NC) → Free run mode(Black Pattern)
   Otherwise : High( 3.3V) → BIST mode(BIST Pattern)
   Sequence : On = VDD ≥LVDS Option , BIST Option ≥Interface signal
   Off = Interface signal ≥ LVDS Option , BIST Option ≥ VDD

**Rear view of LCM**

**BIST Pattern**



**LVDS Interface**

LVDS Receiver : Timing Controller (LVDS Rx merged) / LVDS Data : Pixel Data

< Table 6. LCM Module Input Connector Pin Configuration >

| | LVDS Pin | Vesa Data format | JEIDA Data format | Remark |
|---|---|---|---|---|
| TxOUT/RxIN0 | TxIN/RxOUT0 | Red0 [LSB] | R2 | |
| | TxIN/RxOUT1 | Red1 | R3 | |
| | TxIN/RxOUT2 | Red2 | R4 | |
| | TxIN/RxOUT3 | Red3 | R5 | |
| | TxIN/RxOUT4 | Red4 | R6 | |
| | TxIN/RxOUT6 | Red5 | R7 [MSB] | |
| | TxIN/RxOUT7 | Green0 [LSB] | G2 | |
| TxOUT/RxIN1 | TxIN/RxOUT8 | Green1 | G3 | |
| | TxIN/RxOUT9 | Green2 | G4 | |
| | TxIN/RxOUT12 | Green3 | G5 | |
| | TxIN/RxOUT13 | Green4 | G6 | |
| | TxIN/RxOUT14 | Green5 | G7 [MSB] | |
| | TxIN/RxOUT15 | Blue0 [LSB] | B2 | |
| | TxIN/RxOUT18 | Blue1 | B3 | |
| TxOUT/RxIN2 | TxIN/RxOUT19 | Blue2 | B4 | |
| | TxIN/RxOUT20 | Blue3 | B5 | |
| | TxIN/RxOUT21 | Blue4 | B6 | |
| | TxIN/RxOUT22 | Blue5 | B7 [MSB] | |
| | TxIN/RxOUT24 | HSYNC | HSYNC | |
| | TxIN/RxOUT25 | VSYNC | VSYNC | |
| | TxIN/RxOUT26 | DEN | DEN | |
| TxOUT/RxIN3 | TxIN/RxOUT27 | Red6 | R0 [LSB] | |
| | TxIN/RxOUT5 | Red7 [MSB] | R1 | |
| | TxIN/RxOUT10 | Green6 | G0 [LSB] | |
| | TxIN/RxOUT11 | Green7 [MSB] | G1 | |
| | TxIN/RxOUT16 | Blue6 | B0 [LSB] | |
| | TxIN/RxOUT17 | Blue7 [MSB] | B1 | |
| | TxIN/RxOUT23 | Reserved | Reserved | |

**LED Converter Input Signal & Power**

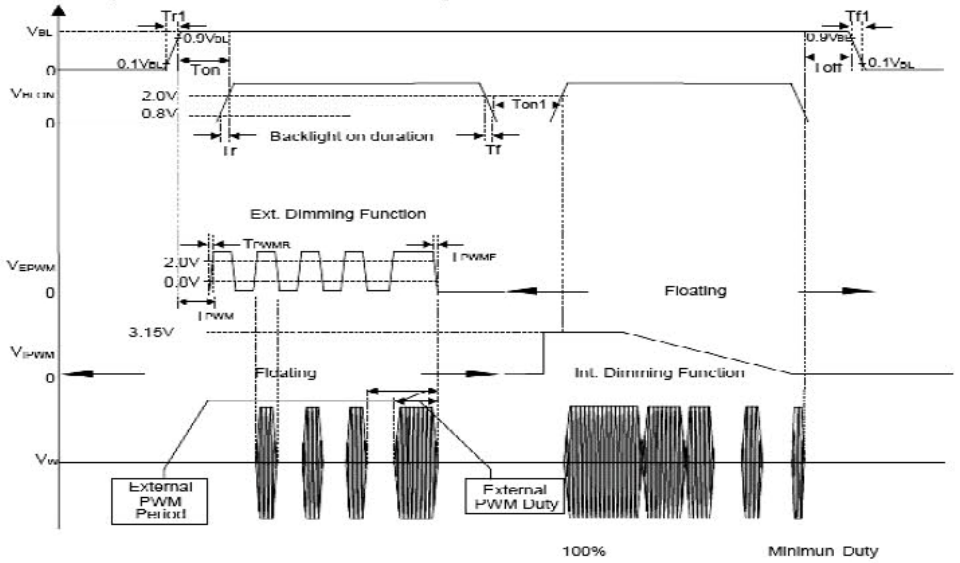
Connector : CI0114M1HRL-NH (Cvilux) or equivalent

< Table 7. LED Converter Input Connector Pin Configuration >

| Pin No | Symbol | Description | Remarks |
|---|---|---|---|
| 1 | VBL | Power Supply +24V | |
| 2 | VBL | Power Supply +24V | |
| 3 | VBL | Power Supply +24V | |
| 4 | VBL | Power Supply +24V | |
| 5 | VBL | Power Supply +24V | |
| 6 | GND | Ground | |
| 7 | GND | Ground | |
| 8 | GND | Ground | |
| 9 | GND | Ground | |
| 10 | GND | Ground | |
| 11 | DET | Normal (Low) / Abnormal (Open Collector) | Low : 0~0.8V |
| 12 | VBLON/OFF | Backlight ON/OFF control | On : 2.8V~5.0V/Off :0~0.8V |
| 13 | VDIM | Internal PWM control signal | Max : 3.3V / Min : 0V |
| 14 | PDIM | External PWM control signal | |

Notice: 1. PIN 13:Internal PWM Control (Use Pin 13): Pin 14 must open.
PIN 14:Extermal PWM Control (Use Pin 14): Pin 13 must open.
Pin 13(VDIM) and Pin 14(PDIM) can't open in same period.

2. While system is turned ON or OFF, the power sequences must follow as below descriptions:
Turn ON sequence: VBL → PWM signal → BLON
Turn OFF sequence: BLOFF → PWM signal → VBL



## 4.0 Signal Timing Specification

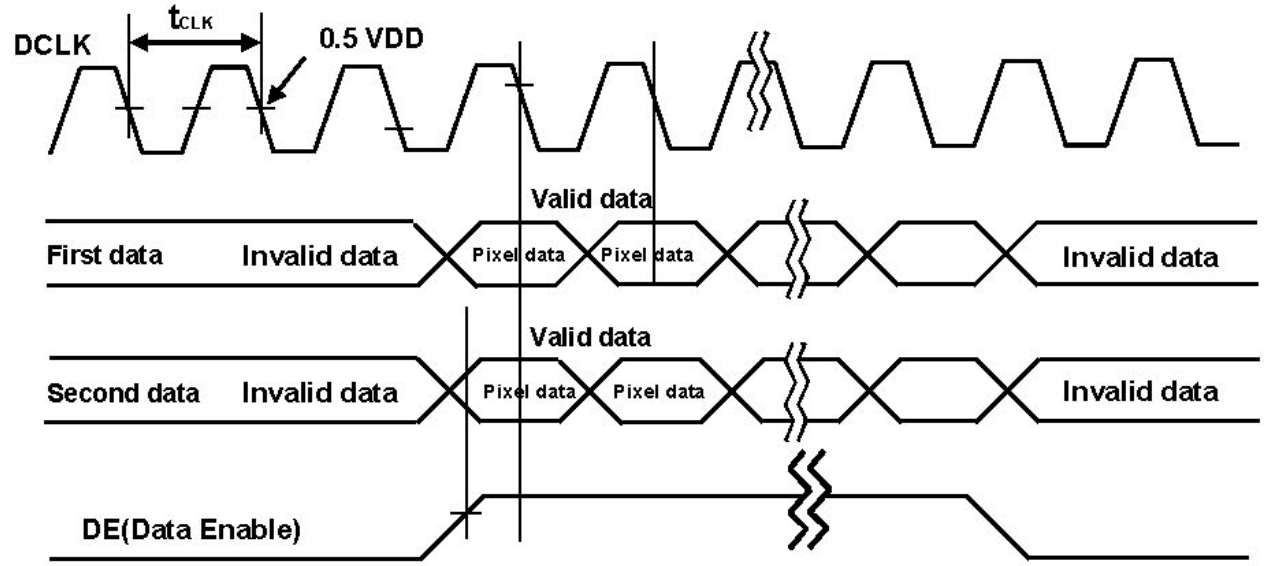
### Timing Parameters (DE only mode)

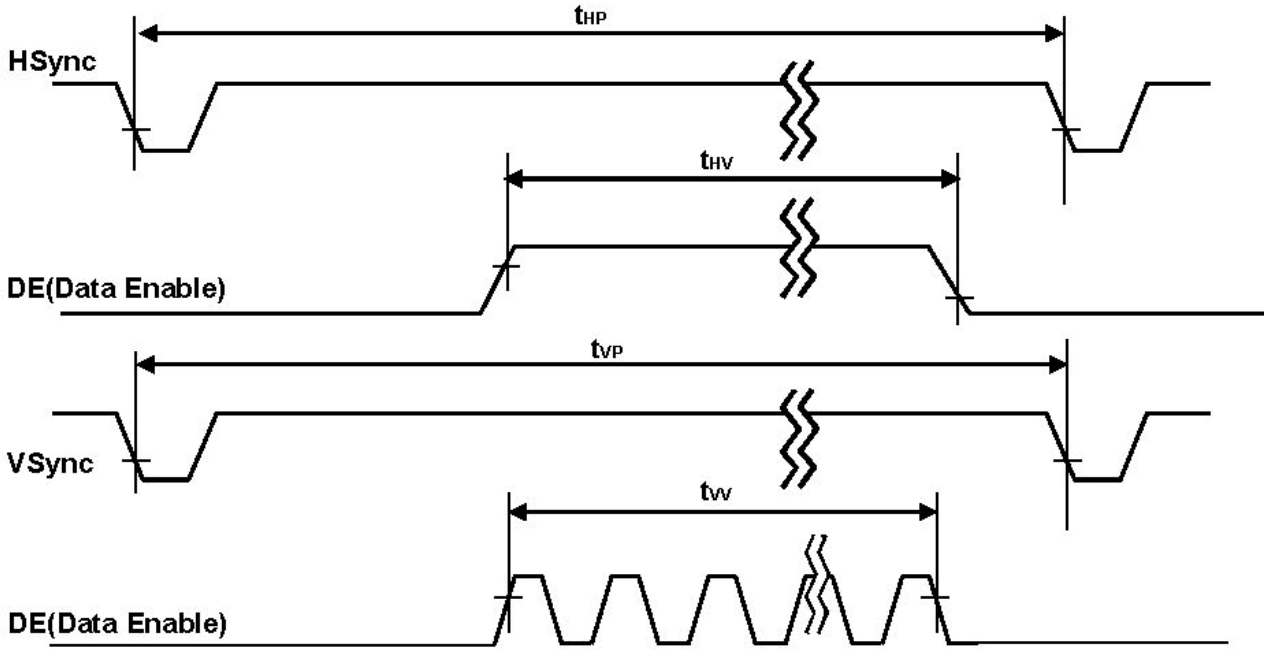
< Table 8. Timing Table >

| ITEM | Symbol | | Min | Typ | Max | Unit | Note |
|---|---|---|---|---|---|---|---|
| CLK | Period | $t_{CLK}$ | 11.8 | 13.3 | 17.9 | ns | |
| | Frequency | - | 56 | 75.4 | 85.0 | MHz | |
| Hsync | Period | $t_{HP}$ | 1450 | 1560 | 2000 | $t_{CLK}$ | |
| | Frequency | $f_H$ | 39.4 | 48.4 | 55 | KHz | |
| Vsync | Period | $t_{VP}$ | 778 | 806 | 1200 | $t_{HP}$ | |
| | Frequency | $f_V$ | 47 | 60 | 65 | Hz | |
| Horizontal Active Display Term | Valid | $t_{HV}$ | - | 1366 | - | $t_{CLK}$ | |
| | Total | $t_{HP}$ | 1450 | 1560 | 2000 | $t_{CLK}$ | |
| Vertical Active Display Term | Valid | $t_{VV}$ | - | 768 | - | $t_{HP}$ | |
| | Total | $t_{VP}$ | 778 | 806 | 1200 | $t_{HP}$ | |

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

## Signal Timing Waveform



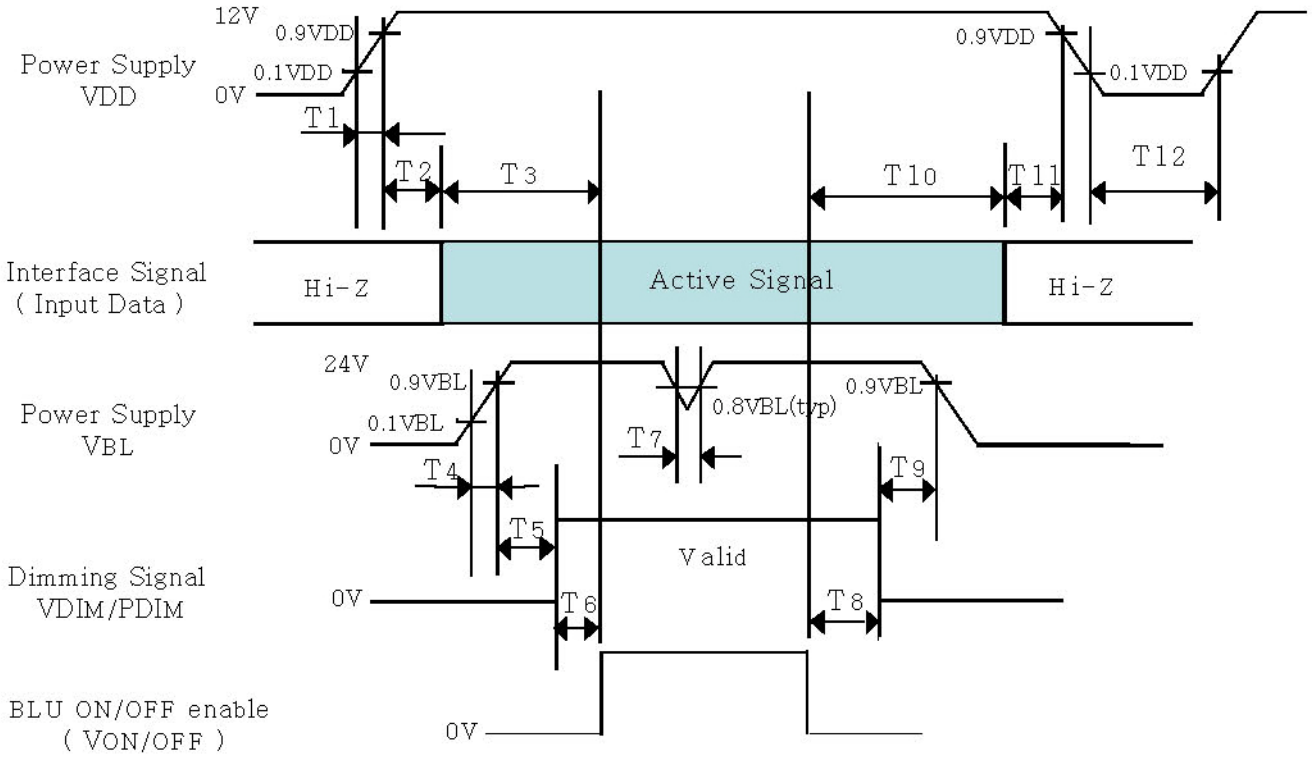



## Input Signals, Basic Display Colors and Gray Scale of Colors

< Table 9. Input Signal and Display Color Table >

| Color & Gray Scale | | Input Data Signal | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Red Data | | | | | | | | Green Data | | | | | | | | Blue Data | | | | | | | |
| | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale of Red | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | △ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▽ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Green | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | △ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▽ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale of Blue | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | △ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | ▽ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale of White | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Darker | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | △ | ↑ | | | | | | | | ↑ | | | | | | | | ↑ | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | ↓ | | | | | | | |
| | Brighter | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | ▽ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

## Power Sequence




< Table 10. Sequence Table >

| Parameter | Values | | | Units |
|---|---|---|---|---|
| | Min | Typ | Max | |
| T1 | 0.5 | - | 20 | ms |
| T2 | 0 | - | 50 | ms |
| T3 | 200 | - | - | ms |
| T4 | 20 | - | - | ms |
| T5 | 500 | - | - | ms |
| T6 | 0 | - | - | ms |
| T7 | - | - | 10 | ms |
| T8 | 0 | - | - | ms |
| T9 | 500 | - | - | ms |
| T10 | 200 | - | - | ms |
| T11 | 0 | - | 50 | ms |
| T12 | 1 | - | - | s |

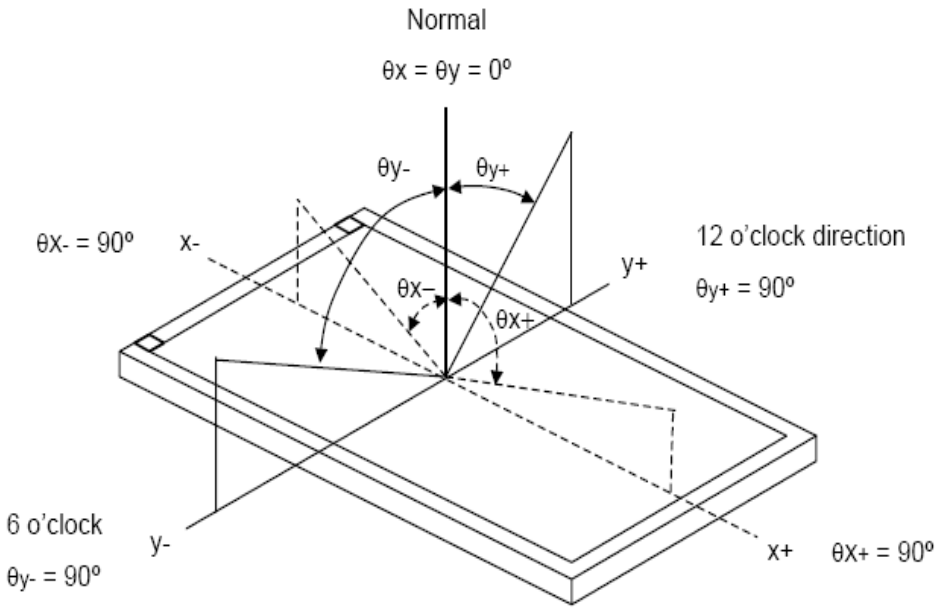
Notes: 1. Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.
2 .Even though T4 is over the specified value, there is no problem if I2T spec of fuse is satisfied.
3. Back Light must be turn on after power for logic and interface signal are valid.

## 5.0 OPTICAL SPECIFICATION

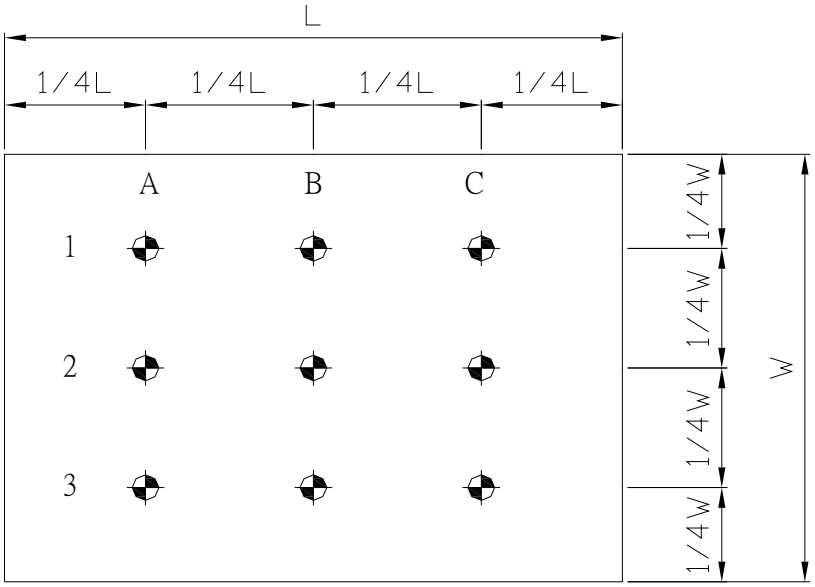
| Item | | Symbol | Condition | Data | Unit | Note |
|---|---|---|---|---|---|---|
| Color chromaticity | **Red** | **Rx** | **θx=0 θy=0 BM-7** | 0.646 | - | Test Mode：（1）（2）（3） |
| | | **Ry** | | 0.324 | - | |
| | **Green** | **Gx** | | 0.275 | - | |
| | | **Gy** | | 0.661 | - | |
| | **Blue** | **Bx** | | 0.143 | - | |
| | | **By** | | 0.060 | - | |
| | **White** | **Wx** | | 0.267 | - | |
| | | **Wy** | | 0.291 | - | |
| Center Luminance of White | | **Lc** | | 700 | **cd/㎡** | |
| Uniform | | **Lu** | | 80 | % | |
| Contrast Ratio | | **CR** | **θx=0 θy=0 Klein K-10** | 1200:1 | - | Test Mode：（1）（4） |
| Color Saturation | | **NTSC** | | 80 | % | |
| Viewing Angle | **Horizontal** | **θx+** | **CR≧10** | 89 | **Deg** | Test Mode：（1）（3） |
| | | **θx-** | | 89 | | |
| | **Vertical** | **θy+** | | 89 | | |
| | | **θy-** | | 89 | | |

**Test Mode：**

（**1**） Definition of Viewing Angle（θx，θy）：

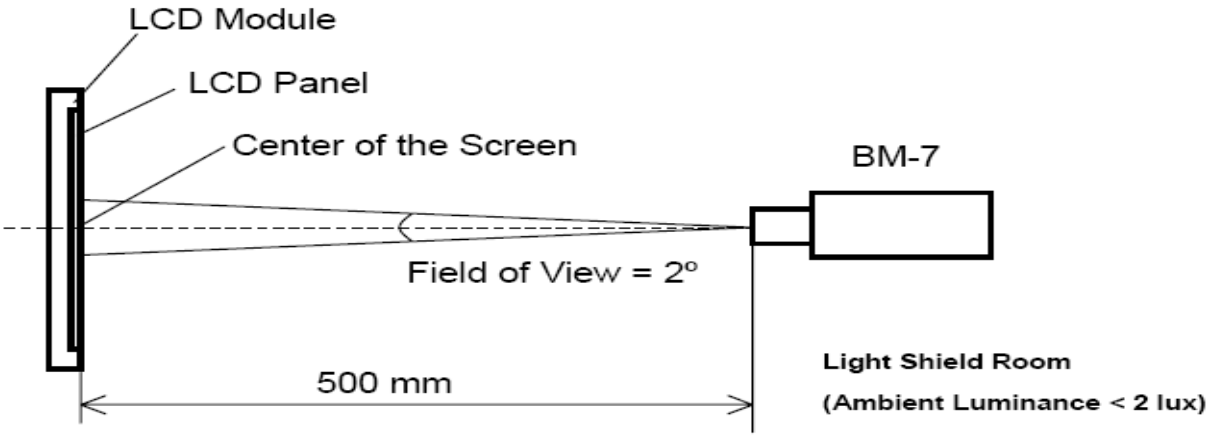


（**2**） Definition of Test Point：

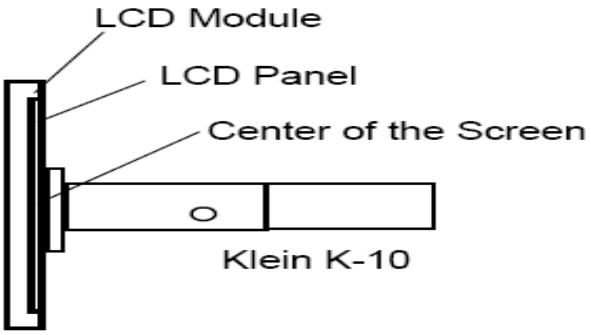



Active Area

（**3**）**BM-7** Measurement Setup**:**




（**4**）**Klein K-10** Measurement Setup**:**



## 6.0 AD2662GDVAR Specification & OSD Functions (SSH2833 only)

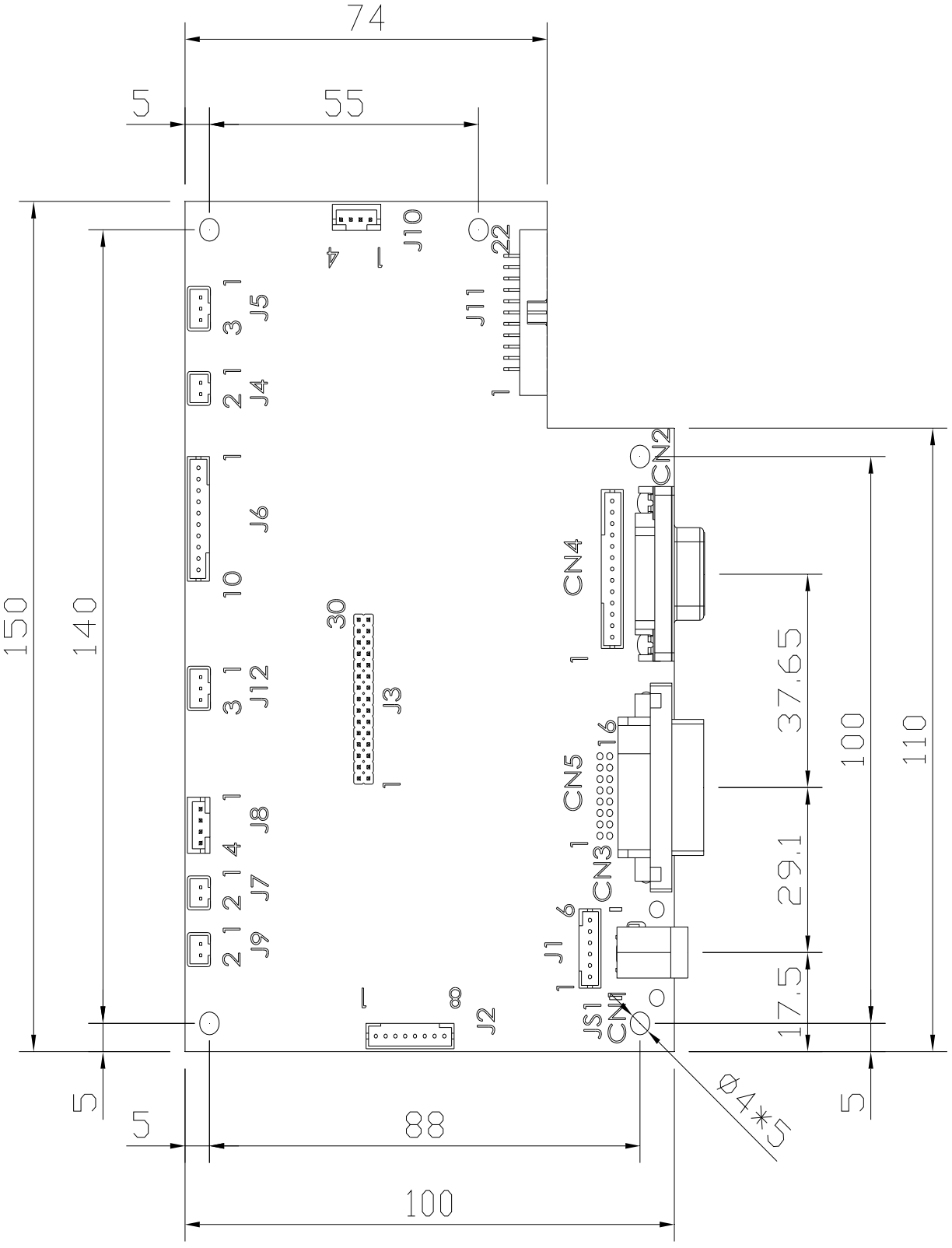
We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has an external luminance sensor as an option, an optional VR button to control brightness, fan rotation and RS232. Rev.1 is European RoHS compliant.

### 6.1 General Description

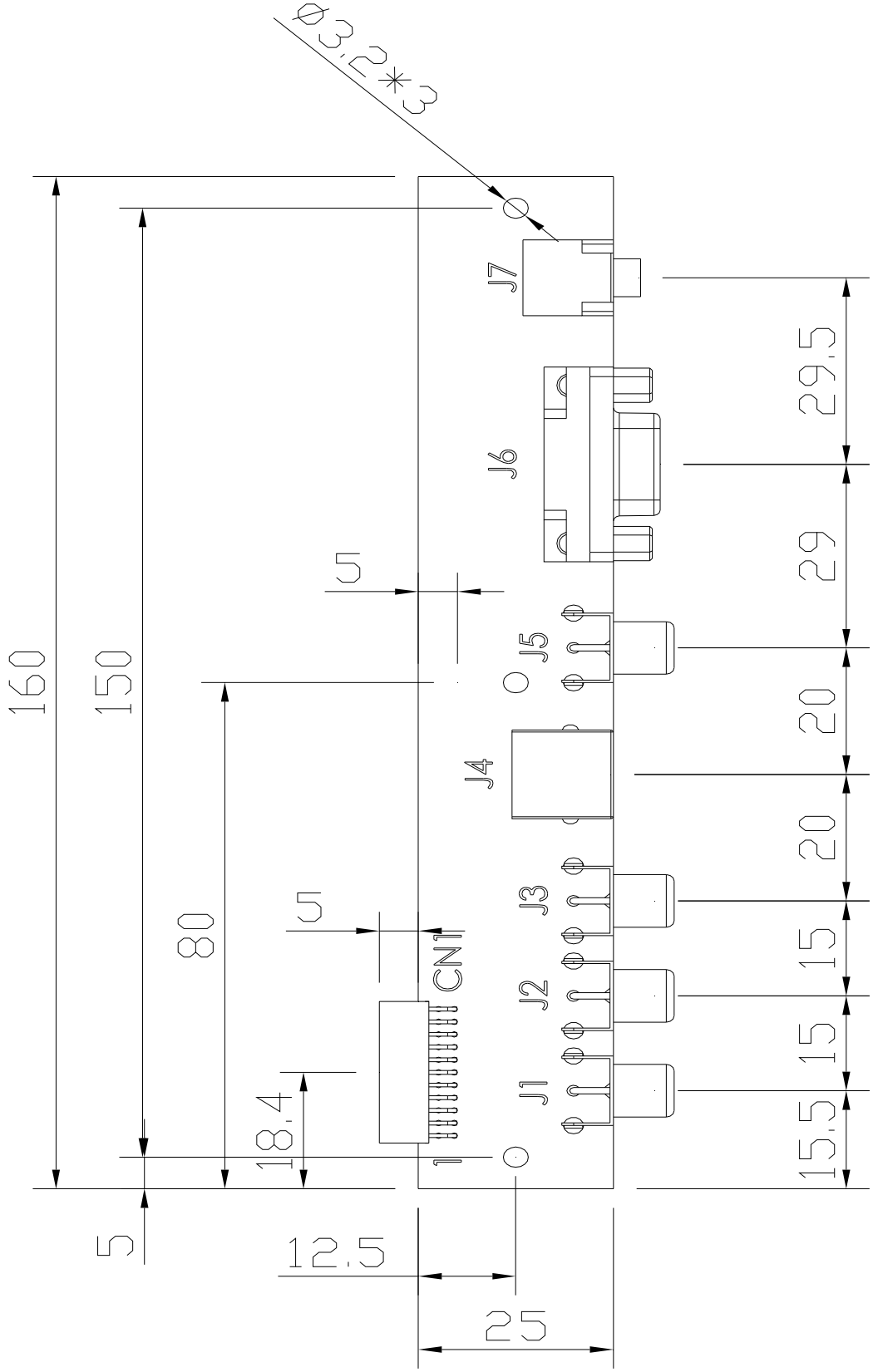
- Max Resolution Up To WUXGA
- Analog RGB Input up to 205MHz
- ULTRA-RELIABLE DVI INPUT
- Dual/single LVDS interface
- Support Panel DC5V or 3.3V, 12V Output
- External Fan Control by Software
- OSD Control
- Inverter Analog or PWM Dimming Control
- *External V.R. brightness control (optional)
- *External light sensor brightness control (optional)
- *External RS232 control (optional)
- Input Power 12V DC
- CBVS, S-VIDEO, YCbCr INPUT
- Audio in and b2Wx2 Audio Out(optional)
- IR Remote control(optional)

**6.2 Outline Dimensions**

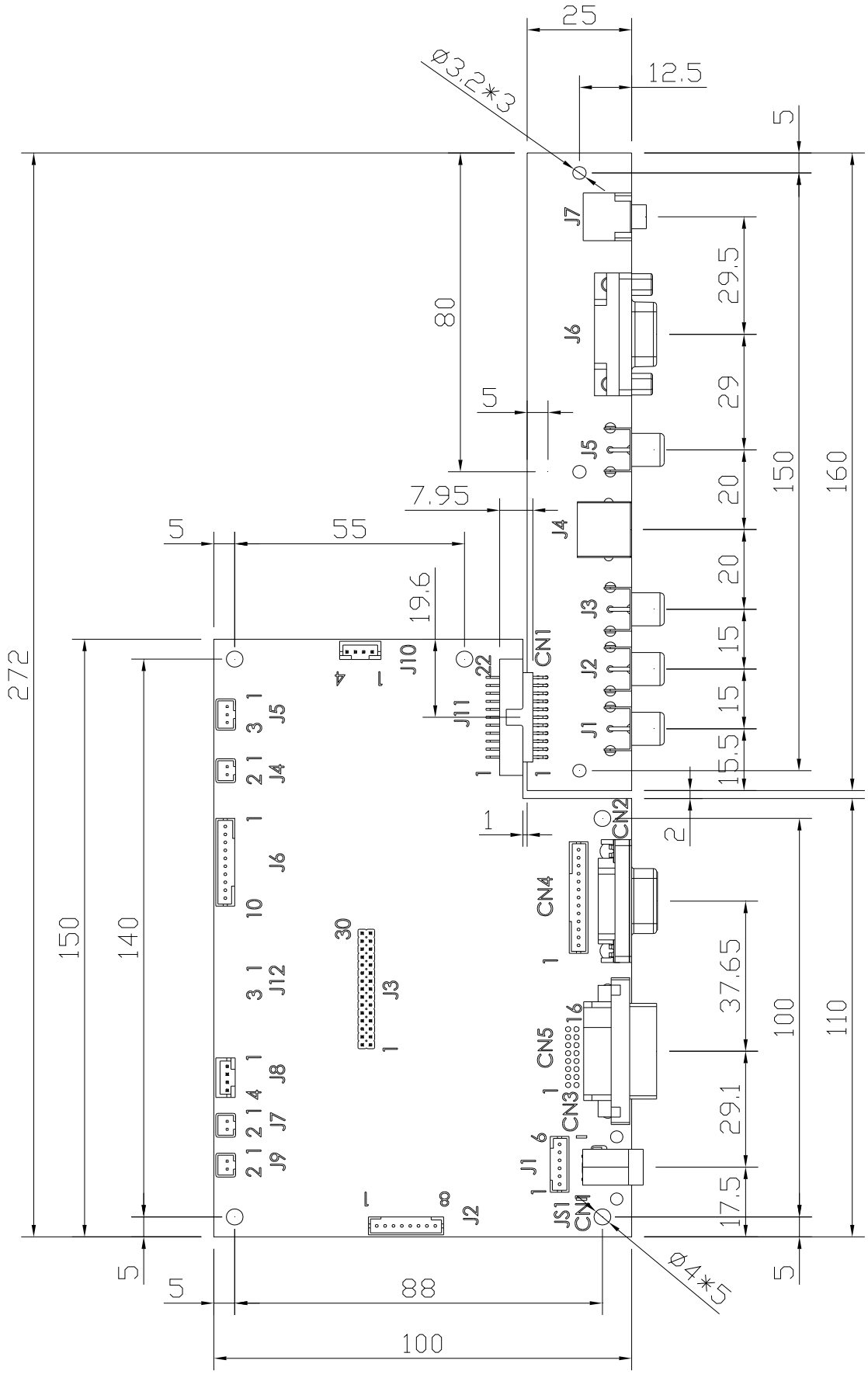
**AD2662GD 150mmX100mmX20mm**



**I/O BOARD 160mmX25mmX15mm**



**AD2662GDVAR 272mmX100mmX20mm**



### 6.3 AD2662 Board Pin Define

**J3: Panel connector**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | RxO0+ | 16 | RxE1- |
| 2 | RxO0- | 17 | RxE2+ |
| 3 | RxO1+ | 18 | RxE2- |
| 4 | RxO1- | 19 | RxEC+ |
| 5 | RxO2+ | 20 | RxEC- |
| 6 | RxO2- | 24 | RxE3+ |
| 7 | RxOC+ | 22 | RxE3- |
| 8 | RxOC- | 23 | GND |
| 9 | RxO3+ | 24 | GND |
| 10 | RxO3- | 25 | GND |
| 11 | GND | 26 | GND |
| 12 | GND | 27 | GND |
| 13 | RxE0+ | 28 | PANEL-VCC |
| 14 | RxE0- | 29 | PANEL-VCC |
| 15 | RxE1+ | 30 | PANEL-VCC |

**CN3: DVI-D INPUT Connector**

| Pin No. | Function | Pin No. | Function | Pin No. | Function |
|---|---|---|---|---|---|
| 1 | T.M.D.S. Data2- | 9 | T.M.D.S. Data1- | 17 | T.M.D.S. Data0- |
| 2 | T.M.D.S. Data2+ | 10 | T.M.D.S. Data1+ | 18 | T.M.D.S. Data0+ |
| 3 | T.M.D.S. Data2/4 Shield | 11 | T.M.D.S Data1/3 Shield | 19 | T.M.D.S. Data0/5 Shield |
| 4 | T.M.D.S. Data4- | 12 | T.M.D.S. Data3- | 20 | T.M.D.S. Data5- |
| 5 | T.M.D.S. Data4+ | 13 | T.M.D.S. Data3+ | 24 | T.M.D.S. Data5+ |
| 6 | DDC Clock | 14 | +5V Power | 22 | T.M.D.S. Clock Shield |
| 7 | DDC Data | 15 | Ground (for +5V) | 23 | T.M.D.S. Clock+ |
| 8 | Not Connected | 16 | Hot Plug Detect | 24 | T.M.D.S. Clock- |

**CN5: DVI-D Connector (16pin 2.0mm)**

| Pin No. | Function | Pin No. | Function | Pin No. | Function |
|---|---|---|---|---|---|
| 1 | RX2- | 7 | DDC_SDA | 13 | GND |
| 2 | RX2+ | 8 | DDC_SCL | 14 | GND |
| 3 | RX1- | 9 | GND | 15 | DVI HP |
| 4 | RX1+ | 10 | GND | 16 | DVI_5V |
| 5 | RX0- | 11 | RXC- | | |
| 6 | RX0+ | 12 | RXC+ | | |

**CN2: Analog RGB Input connector (D-SUB 15Pin)**

| Pin No. | Symbol | Description | Pin No. | Symbol | Description |
|---|---|---|---|---|---|
| 1 | RED | Analog Red | 9 | +5V | +5VDDC |
| 2 | GREEN | Analog Green | 10 | SGND | Sync GND |
| 3 | BLUE | Analog Blue | 11 | NCD | Reserved |
| 4 | GND | Reserved | 12 | SDA | DDC Serial Data |
| 5 | NC | VGA_CAB | 13 | HSYNC | Horizontal Sync |
| 6 | RED_RTN | Red Return | 14 | VSYNC | Vertical Sync |
| 7 | GREEN_RTN | Green Return | 15 | SCL | DDC Data Clock |
| 8 | BLUE_RTN | Blue Return | | | |

**CN4: Analog RGB Input connector (13pin connector)**

| Pin No. | Symbol | Description | Pin No. | Symbol | Description |
|---|---|---|---|---|---|
| 1 | SCL | DDC Data Clock | 8 | BGND | Blue Return |
| 2 | SDA | DDC Serial Data | 9 | BLUE | Analog Blue |
| 3 | GND | Reserved | 10 | GGND | Green Return |
| 4 | +5V | +5VDDC | 11 | GREEN | Analog Green |
| 5 | GND | Reserved | 12 | RGND | Red Return |
| 6 | VSYNC | Vertical Sync | 13 | RED | Analog Red |
| 7 | HSYNC | Horizontal Sync | | | |

**JS1: Power DIN(12V)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | 12VDC | 2 | 12VDC |
| 3 | GND | 4 | GND |

**JS1: Power Jack (12V)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | 12VDC | 2 | 12VDC |

**J1: Power connector (12V) (6PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | 12VDC | 4 | GND |
| 2 | 12VDC | 5 | GND |
| 3 | 12VDC | 6 | GND |

**J8: Power connector (5V/12v)(4PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | 5VDC | 2 | GND |
| 3 | 12VDC | 4 | GND |

**J2: Inverter Connector(8PIN 2.0mm)**

| Pin No. | Symbol | Description | Pin No. | Symbol | Description |
|---|---|---|---|---|---|
| 1 | ON/OFF | Backlight ON/OFF | 5 | GND | GND |
| 2 | BRIGHT | Dimming adjust | 6 | 12VDC | Input 12VDC |
| 3 | GND | GND | 7 | 12VDC | Input 12VDC |
| 4 | GND | GND | 8 | 12VDC | Input 12VDC |

**J7, J9: FAN (2PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | FAN(+) | 2 | GND |

**J6: Key Pad (9PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | POWER KEY | 6 | MENU KEY |
| 2 | GREEN LED | 7 | AUTO KEY |
| 3 | RED LED | 8 | GND |
| 4 | DOWN KEY | 9 | GND |
| 5 | UP KEY | | |

**J10: Speaker Connector (4PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | SPK-R | 2 | GND |
| 3 | GND | 4 | SPK-L |

**J11 Extern Funtion Connector (11P X 2PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | Pb | 2 | Y |
| 3 | GND | 4 | Pr |
| 5 | GND | 6 | SY |
| 7 | GND | 8 | SC |
| 9 | GND | 10 | AV |
| 11 | GND | 12 | GND |
| 13 | TXD | 14 | RXD |
| 15 | GND | 16 | GND |
| 17 | GND | 18 | GND |
| 19 | Audio-L | 20 | Audio-R |
| 24 | GND | 22 | GND |

**J5: Ambient (3PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | 3.3VDC | 2 | Sensor Out |

**J4: VR connector (3PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | 3,3VDC | 2 | VR Out |
| 3 | GND | | |

**J12: IR Connector(3PIN 2.0mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | IR Out | 3 | 3.3VDC |
| 2 | GND | 4 | |

**JP1: PANEL VCC (3PIN 2.54mm)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1-2 | 12V | 5-6 | 3.3V |
| 3-4 | 5V | | |

### 6.4 I/O BOARD Pin Define

**J1:Component Y**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | Y | 2 | GND |

**J2:Component Cb**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | Cb | 2 | GND |

**J3:Component Cr**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | Cr | 2 | GND |

**J4:S-Video**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | GND | 2 | GND |
| 3 | Luminance | 4 | Chrominance |

**J5:Composite**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | Y | 2 | GND |

**J6:D-SUB9(RS232)**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | NC | 2 | TXD |
| 3 | RXD | 4 | NC |
| 5 | GND | 6 | NC |
| 7 | NC | 8 | NC |
| 9 | NC | | |

**CN1:11P X 2 Connector**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | Component Cb | 2 | Component Y |
| 3 | GND | 4 | Component Cr |
| 5 | GND | 6 | S-Video Y |
| 7 | GND | 8 | S-Video C |
| 9 | GND | 10 | Composite |
| 11 | GND | 12 | GND |
| 13 | TXD | 14 | RXD |
| 15 | GND | 16 | GND |
| 17 | GND | 18 | GND |
| 19 | Audio IN(L) | 20 | Audio IN(R) |

### 6.5 IR Receive Board Pin Define

**J1: IR Connector**

| Pin No. | Function | Pin No. | Function |
|---|---|---|---|
| 1 | DATA OUT | 2 | GND |
| 3 | VCC | 4 | NC |

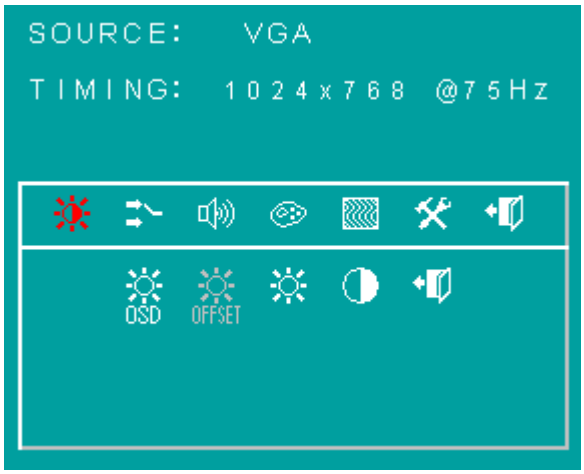
### 6.6 DC Characteristics.

| | | |
|---|---|---|
| Power Consumption | 10W | Note1 |
| Operation Temperature | 0~70 | ℃ |
| Storage Temperature | -20~85 | ℃ |

Note: These values are for the A/D board body.

### 6.7 OSD menu

Here are some instructions for you to use the OSD (On Screen Display). By pressing the “menu”, you will see the below picture.
Timing shows resolution, H-frequency, and V-frequency of the panel. Version shows the firmware control version. This 2 information is not changeable by user.




There are 7 sub pages inside the OSD manual, Brightness, Signal select, Sound, Color, Image, Tools, and Exit.

When you press “menu” button, you enter the “Brightness” sub page. You will see 5 selections:

press ’’menu’’

press ’’menu

press ’’menu’’

**OSD Brightness:**

press ’’right’’ key

press “menu” once, you can go into adjust the brightness. Press “left” you can dim down the brightness to “0”, while press “right” you can increase the brightness to “100”.

**Ambient light sensor:** press this Icon, must to accompany with Litemax ambient light sensor to auto dimming.(OPTION)

**Potentiometer:** press this icon, adjust VR function.(OPTION)

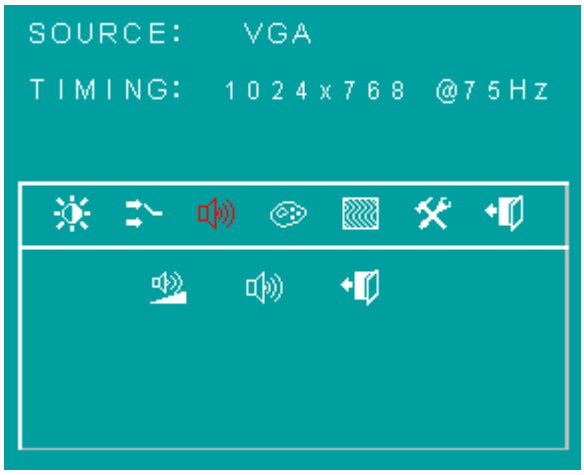
**Ambient light sensor with OSD offset**: press this Icon

Press ’menu’’ once, you can adjust min. luminance to fit your application (OPTION)

**Contrast:** Press “menu” and “right” you can adjust the contrast from “0” to “100” by pressing the “left” and “right”.

**Exit:** You can exit this sub menu back to normal screen.

## Sound :




There are 3 options for “Sound” sub page.

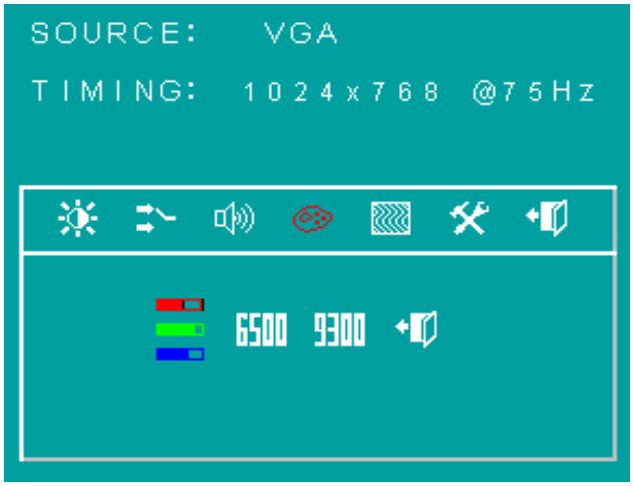
**Audio Volume:** Audio volume adjustment.

**Mute:** You can mute the speaker by pressing this option.

**Exit:** back to the normal screen.

**Auto Color:** by press this “Auto Color” option, you can get the optimal color performance.

**SRGB:** Windows standard color setting.




**Color Tempture:** You can have 3 options in this selection.

**Color Tempture User**

**Color Tempture_6500K**

**Color Tempture_93OOK**

“user mode”, “6500K” (Warm color scheme), “9300K (Cold color scheme).
Def ault is “user”, and inside all “R”, “G”, and “B” are set “100”

**Exit:** back to the normal screen.

## Image :

Go into the “Image” page, you can see below picture.

**Auto just:** Pressing this option, the AD2662 will adjust the optimal frequency of horizontal and vertical. You will see “Auto tune….” On the screen for around 3 seconds.

**Clock:** If you are not satisfied about the Autotune result, you can adjust manually by “Clock”.
The screen will be “wider” if you adjust this function.

**Phase:** If you see “double image” on characters, you can adjust “Phase” to make it perfect image.

**HPos:** You can shift the screen horizontally by this function.

**Vpos:** You can shift the screen vertically by this function.

**Exit:** Back to normal screen.

## TOOLS :

On the “Tools” sub menu, you will see 4 icons.

**Osd Control:** Select this option, you will see 4 more options:

**Osd_time:** You can selection the time of OSD from 2 sec. to 16 sec. D

**Osd_HPos:** You can move the OSD horizontally over the screen.

**Osd_VPos:** You can move the OSD Vertically over the screen.

**Exit:** back to main menu.

**Factory_Reset:** By pressing this, the screen will be back to the factory setting on very beginning and lost all the personal settings.

**Sharpness:** You can make the characters looks sharper.

**Exit**

## BURNIN MODE :

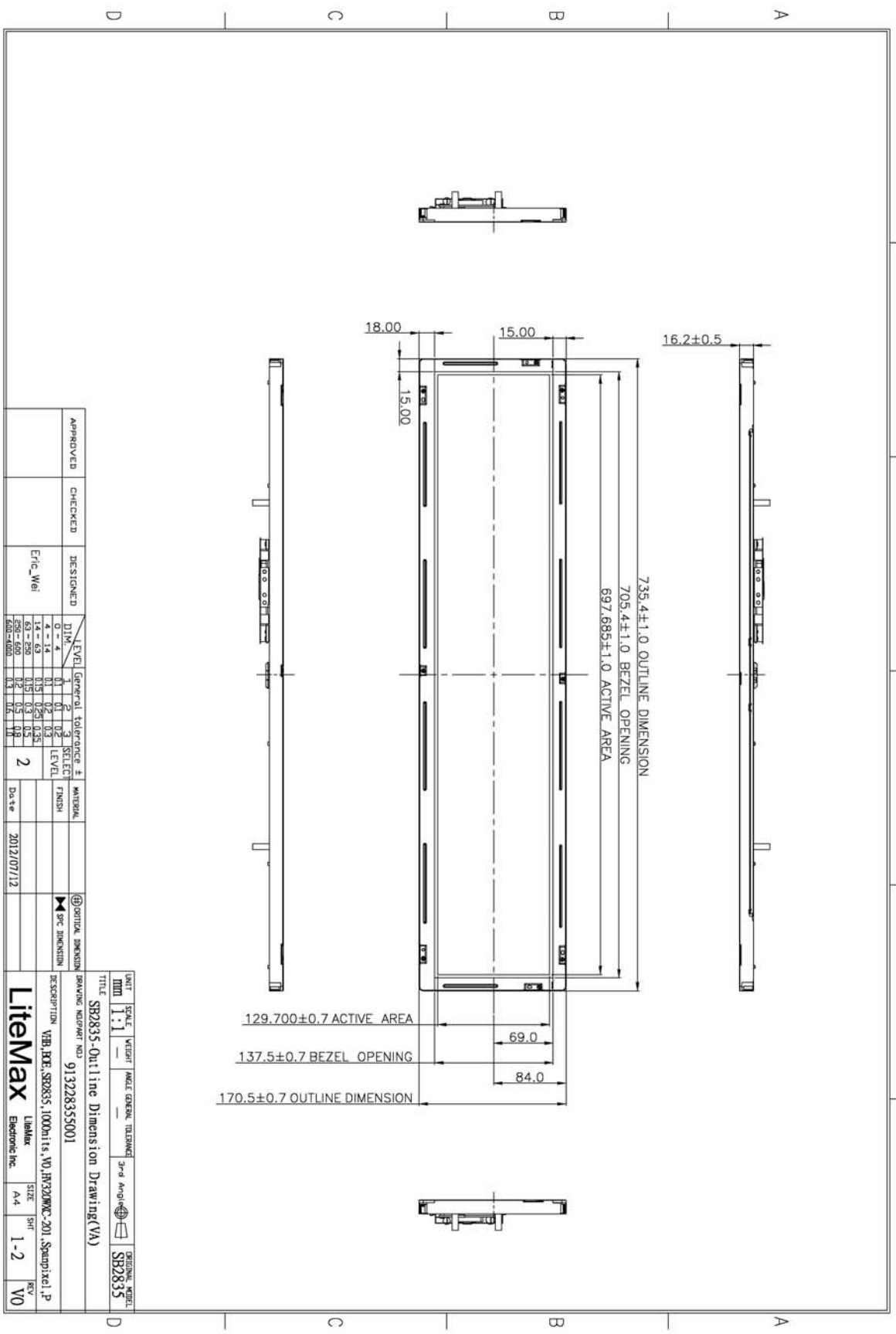
Factory Burn-in mode: While your VGA cable is connected on the monitor, press “Menu” and Left and Right <” simultaneously, you will see “BURN IN MODE” on the center of the screen for 3 sec. Then unplug the VGA cable, the screen will show Red, Green, Blue, White, and Black in sequence automatically.
You can plug in the VGA signal cable,and re-plug the power connector to exit the burn-in mode.

## KEY LOCK MODE :

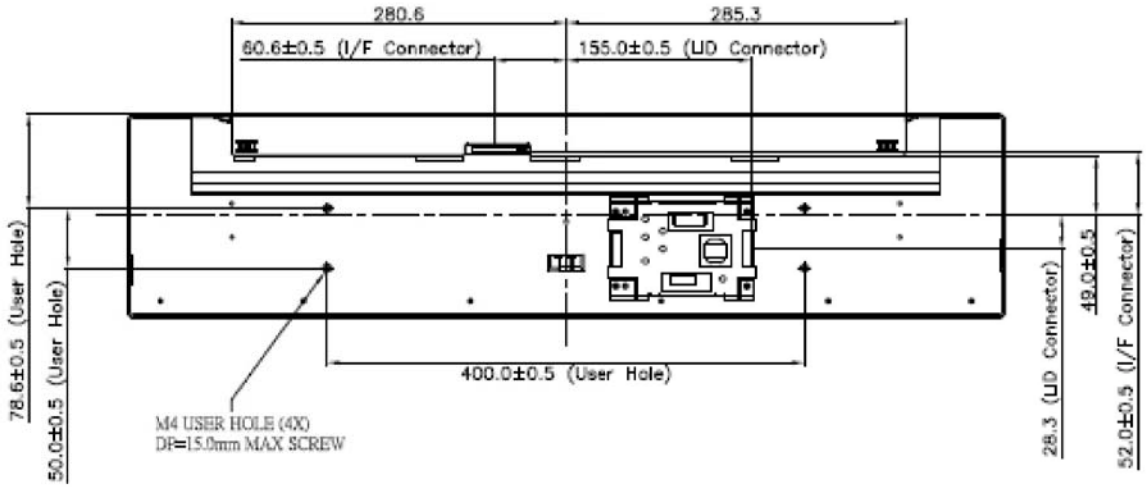
OSD Lock Function: It is possible to lock all the OSD buttons to prevent unauthorized changes to occur by pressing “Menu” and “right >” buttons simultaneously. You will see the “lock” icon below on the center of the screen for 3 seconds. If any button is pushed after the lock function is initiated, the below icon will appear on the screen.'

To release the OSD lock, press “Menu” and “Right >”. The below icon will appear on the center of the screen for 3 seconds. Now all OSD keys are active again.

## 7.0 MECHANICAL DRAWING



| REV | ECN NO. | DESCRIPTION | SIGN | DATE |
|---|---|---|---|---|
| V0 | | ISSUE DRAWING | Eric Wei | 2012/07/12 |
| | | | | |




| APPROVED | CHECKED | DESIGNED | LEVEL / DIM. | General tolerance ± | | | SELECT LEVEL |
|---|---|---|---|---|---|---|---|
| | | Eric_Wei | 0 ~ 4 | t0.1 | t0.2 | t0.2 | 2 |
| | | | 4 ~ 14 | t0.1 | t0.2 | t0.3 | |
| | | | 14 ~ 63 | t0.15 | t0.25 | t0.35 | |
| | | | 63 ~ 250 | t0.2 | t0.3 | t0.4 | |
| | | | 250 ~ 400 | t0.3 | t0.5 | t0.6 | |
| | | | 400~1000 | t0.4 | t0.6 | t0.8 | |

| MATERIAL | | CRITICAL DIMENSION |
|---|---|---|
| FINISH | | SPC DIMENSION |
| | | |
| Date | 2012/07/12 | |

| UNIT | SCALE | WEIGHT | ANGLE GENERAL TOLERANCE | 3rd Angle | ORIGINAL MODEL |
|---|---|---|---|---|---|
| mm | 1:1 | — | — | | SB2833 |

TITLE: SB2833-Outline Dimension Drawing(VA)

DRAWING RELEVANT NO.: 913228333001

DESCRIPTION: WIB,BOE,SB2833,700nits,V0,HV920WXC-201,Spenpixel,P

LiteMax — LiteMax Electronic Inc. | SIZE: A4 | SHT: 2-2 | REV: V0

## 8.0 PRECAUTIONS

HANDLING PRECAUTIONS

(1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
(2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
(3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
(4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
(5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
(6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
(8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
(9) Do not disassemble the module.
(10) Do not pull or fold the lamp wire.
(11) Pins of I/F connector should not be touched directly with bare hands.

STORAGE PRECAUTIONS

(1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
(2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
(3) It may reduce the display quality if the ambient temperature is lower than 10 ºC. For example, the response time will become slowly, and the starting voltage of lamp will be higher than the room temperature.

OPERATION PRECAUTIONS

(1) Do not pull the I/F connector in or out while the module is operating.
(2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.